

UNIVERSAL METHODS AND DEVICE FOR HAND-HELD PROMOTIONAL OPPORTUNITIES

Cross-Reference to Related Applications

This application is based upon Provisional Patent Applications entitled "Interactive Hand-Held Promotional Communication Devices", Serial No.: 60/195,542, Filed 7 April 2000 by Edward J. Koplar and Daniel A. Ciardullo, entitled "Method and Hardware for Redemption of a Multi-Use Smart Card", Serial No.: 60/207,460, Filed 25 May 2000 by Daniel A. Ciardullo and James G. Withers, entitled "Display Encoding for Monitors", Serial No.: 60/266,238, Filed 4 February 2001 by Edward J. Koplar, Christopher E. Chupp, and Daniel A. Ciardullo, which are herein incorporated by reference; and continued preservation of which are requested.

Background of the Invention

The present invention relates to interactive hand-held devices, and more particularly to methods and apparatuses for receiving and decoding modulated signals for use by hand-held devices, and receiving benefits from receptions of the signals.

The hand-held device of the present invention receive modulated signals for purposes including enjoyment, promotion, transfer of information, data collection, commercial verification, security, education, and transactions or verifications at points of sale, as well as other commercial, personal, entertainment, or amusement purposes collectively referred to herein as "promotional opportunities." Data is preferably sent to the hand-held device by optical or electrical means, although the device is independent of a specific transmission protocol and therefore may alternatively be sent via other know methods in the art. Data may be received by the hand-held device by utilizing a sleeve, cradle, or docking station; through an optical lens, by use of a PCMCIA or alternate computer port, or by FM, AM, and or other radio frequency means, or other means as may be required based on the type of transmission means selected. Use of the device may allow users to receive, process, and/or store promotional opportunities.

U.S. Patent 4,807,031 Broughton et al. ("Broughton") titled "Interactive Video Method and Apparatus" relates generally to in-band video broadcasting of commands and other encoded information to interactive devices. The invention described therein relates generally to interactive educational and entertainment systems, and is described in one embodiment in the

context of television program control of toys located where there is a television receiver, as within a residence.

To encode control data capable of providing a benefit to a user, Broughton discloses a novel method of luminance or chrominance modulation of a video signal that creates a composite video signal, whereby control data is created by modulating the video signal. The novel modulation method alternately raises and lowers the luminance/chrominance of adjacent horizontal scan lines to create a video subcarrier that contains the control data.

Under Broughton, the video signal is not being replaced with other data, nor is the data being added as a separate signal along with the video signal, rather, the video signal itself is modulated to subsequently create the control data. Therefore, the control data is a part of, or contained within, the video signal. The encoding method also includes preview and remove circuitry to ensure suitability or the presence of data encoding and removal of data encoding, respectively.

The control data is transmitted either by television broadcast means, or by pre-recorded video players that are connected to a video display. The control data is then received by the video display where a video field of the video display is modulated by control data. The control data is then detected with either opto-electronic or RF (radio frequency) detection means that discriminate the program material from the control data. The detected control data is further reproduced such that the control data can be used with an interactive device.

A practical example of a device as described above is the commercially-sold hand-held game device for receiving and detecting such control data called the "Wheel of Fortune" ITV Play-Along Game, intended to be used while viewing a television program presentation of the famous television show of the same name. The device, produced under license by the assignee of Broughton, was a palm-sized device that included a photosensor within its case to receive video signals. The device, upon receiving composite video signals, then discriminated the control data from the video program material and caused a liquid crystal display ("LCD") on the face panel of the toy to present portions of a word puzzle. Thereby users of the device may play the game along with a contestant, or play in response to a videotaped presentation of the game. The "Wheel of Fortune" interactive television (ITV) game together with its hand-held control device including keyboard was commercially available in 1988.

An improvement on the method of modulation described in Broughton is described in U.S. Patent 6,094,228 to Ciardullo et al. ("Ciardullo"). In Ciardullo, improved methods of modulation are disclosed. Control data is inserted on the visual portion of a video signal by changing the luminance of paired lines in opposite directions, thus allowing larger amounts of data to be modulated in a signal. Broughton and Ciardullo are both incorporated by reference herein.

Efforts by others to provide hand-held devices capable of receiving transmission of modulated data from a video display are represented by U.S. Patents 5,594,493; 5,761,601; 5,767,896, 5,907,350, and 5,953,047. Of these, patent 5,907,350 discloses a method for storing data on a so-called smart card, which is contended to receive, decode and store encoded data signals comprising redeemable coupons said to be embedded within television segments and transmitted along with normal television segments. The device of patent 5,907,350 is a hand-held unit that receives luminance signals from the television display in accordance with the principles of Broughton. The received video signals are decoded and stored within the card for future use. An LCD readout enables Universal Price Codes ("UPC") corresponding to the stored data. A scanner reads the UPC codes at a redemption site, and the stored coupon is then erased from a memory of the card. A microprocessor channels the decoding and storage aspects, and a keypad allows use and input.

The term "smart card" as used in the above patents, connotes a hand-held, portable device, not conceptually different from the above-mentioned "Wheel of Fortune" ITV game device. However, the term does not only apply to those patents.

As a generic term, "smart card" gradually has come to mean a card that looks like a credit card but includes a microchip or microprocessor embedded or incorporated into the card. The smart card may be referred to as a "fingerheld" computer, typically including a data storage media ranging from less than a kilobyte up to a megabyte (if not more), and are said to have originated in France. Ognibene, P.J., "Card Smarts," Technology Decisions (July, 1999). Smart cards may, according to a line of reference, also be called "chip cards."

Prior efforts by the inventors of this patent application include United States Utility Patent Application entitled "Interactive Optical Cards and Other Hand-Held Devices with Increased Connectivity", Serial No.: US 09/489,373, Filed January 21, 2000 by Edward J. Koplar and Daniel A. Ciardullo ("Koplar"), which is incorporated by reference herein. Koplar

relates to various methods and apparatuses for use with promotion opportunities, such as interactive advertising and gaming. Koplar describes various methods for receiving and providing data to hand-held devices, as well as apparatuses for use with promotional opportunities and methods of using the same.

While the hand-held devices of the present invention may be in the form of a smart card, they may also be in the form of other hand-held devices such as mobile phones. Recently, mobile phones have become equipped with increased capacity to store and process information, and many phones now offer limited network or Internet access. Industry experts estimate that by 2002, more than 100 million mobile phones will have Internet access in some fashion and that by 2003, more than 1 billion mobile phones will be in use worldwide. Mobile phones, with or without Internet access, may become powerful tools when appropriately configured to receive auxiliary data.

The personal digital assistants ("PDAs") are another form of hand-held device that may provide users with promotional opportunities under the present invention. The most popular manufacturer, Palm Computing, introduced its first PDA called the "Palm Pilot" in 1996. The latest version of the Palm Pilot, Palm VII, was introduced in 1999 and was the first PDA to include wireless Internet access without needing peripheral devices such as a modem.

PDAs and mobile phones, while capable of providing Internet access, as of the time of this invention have limited capabilities, including slow transfer rates of data. It is desirable to provide users of such hand-held devices and similar devices such as smart cards with hand-held devices that are compact in size yet rich in content that encourage users to participate in various promotional opportunities without having prolonged delays in receiving and processing information. Smart cards, mobile phones, PDAs, and similar hand-held devices are all capable of participating in the promotional opportunities described in this patent application.

For purposes of the present invention, the terms "hand-held device" and "card" mean an interactive device of portable character, preferably of hand-held type which may be carried in the palm by a user, between fingers of the user, or is otherwise intended to be easily grasped and handled manually by the user, including credit card-like devices.

The term "sponsor" is used herein in its broadest possible sense, and may include without limitation entities that issue hand-held devices and entities that accept them or provide

redemption services for users of the devices. Sponsors may also include health care and medical institutions and other service or eleemosynary organizations.

The term "computer" is used herein in its broadest possible sense, and may include without limitation a laptop or personal computer, mobile phone, personal digital assistant, or other computer-like device.

Summary of the Invention

Among the several objects, features and advantages of the invention may be noted the provision of interactive hand-held devices for carrying out various modes of novel and commercially advantageous signaling, information-transferring, and value-indicating methods. The hand-held devices of the present invention are portable devices such as smart cards, mobile phones, and personal digital assistants ("PDAs"), which contain means to receive auxiliary data by various possible transmission protocols. The hand-held devices, to provide some of the promotional opportunities described herein, preferably have means to connect to the Internet, which may be referred to herein interchangeably as "network access", "wireless access", "Internet access" or "wireless Internet". These hand-held devices react from the reception of auxiliary data from sources including radio transmissions, computer systems, video recordings, video transmissions or other sources for reproduction of video, audio and/or other data. The hand-held devices, preferably utilize the transmission methods described in Broughton and Ciardullo pertaining to reception of auxiliary data from a video display via electrical and/or optical detection and decoding means. All video displays, whether a television set or monitor, television-like, or image-presenting display device capable of displaying an image containing a modulated video signal, may in the present specification be collectively referred to simply as "display devices." The hand-held devices may also respond to auxiliary data received from non-video displays, such as may be received directly from audio transmissions or a decoding box.

Signals are received, detected, and reproduced by the new hand-held devices for various promotional opportunities including: enjoyment; promotion; coupon or prize validation; advertising by sponsors; advertising verification and polling; transfer of information; data collection; commercial verification; security and access; education; game playing; transactions, verifications, or redemption by sponsoring entities or related commercial locations at points of sale including the Internet; other commercial and non-commercial purposes.

Auxiliary data transmitted to the hand-held devices of the present invention are encoded

using a system of modulation, preferably as described in Broughton or Ciardullo, but alternatively by other known methods of modulation in the art including through the use of the vertical-blanking interval (VBI), audio subcarrier, electromagnetic subcarrier, and RF detection of video decoding. The video signals containing the auxiliary data may be transmitted to a display device by means of a broadcast, cable, standard digital video methods, satellite or home video.

Other objects, features and advantages of the invention include:

A method of interactive advertisement and promotion signal transmission using interactive hand-held devices in such a manner that both the mode of transmission of information and the display of received information and/or value indicative thereof will attract viewers' attention, stimulate viewers to pay attention to a transmission (which may be commercial advertising), and effectively entice viewers to respond and take action in response to its reception, as well as achieving the foregoing usage purposes.

Thus, there is described herein a system which includes:

A method of such signal transmission that is cost effective, brand efficient, and fun for users of the new interactive hand-held devices;

A method of such signal transmission using interactive hand-held devices which effectively increases customer awareness, retention, and differentiation of advertisers' messages and products;

A method of such signal transmission using video interactive hand-held devices which allows viewers of television (or video) presentations, including advertising, to directly interact with the devices (such as television receiver or display);

A method of such signal transmission using interactive hand-held devices that builds store (point-of-sale) traffic, fosters consumer loyalty, and gives viewers a reason to pay more attention to a company's products, services and advertising;

A method of such signal transmission using video interactive hand-held devices which allows viewers of television (or video) presentations, including advertising, to upload received information to a computer which displays and uses relevant Internet addresses, textual information or code, and other promotional information usable by a computer or computer-like device; and

Hand-held devices which are intrinsically simple, effective and economical to make and distribute widely, and are reliable and easy to use.

The following are merely illustrative of some of the advantages and objects which the new system provides: television advertising response determination; interactive advertising and promotions; attraction of viewers' attention; effectively increase consumer awareness and retention of commercial advertising, messages, announcements, promotions, and specific products and services; increased customer differentiation of products and services; stimulation of viewers to watch commercials; increase of store traffic in response to commercial messages; fostering of consumer loyalty; enhancement of viewer involvement in program content, including commercials; enhancement of viewer retention of the content of commercial and other messages; enhancement of the value of commercial messages; increased product/service sales; saving of advertising costs; acceleration of response time of customers following delivery of commercial messages; verification of contests and awards; enhancement of viewer retention of the related website domain names; reduction of barriers related to e-commerce opportunities; additional and sometimes instant rewards and information obtainable via the Internet. The uses and advantages are more fully developed in the following description.

Briefly, herein is described a system which uses various hand-held devices to derive benefits from the reception of auxiliary data. Auxiliary data is encoded by modulation a signal, such as video, which thereby creates a composite video signal consisting of auxiliary data and continuous video program data. The composite video signal is transmitted to and displayed by a display device so that it may be received and used by a hand-held device.

When the hand-held device is a smart card, the preferred method of receiving auxiliary data from composite video signals is by optically detecting and extracting the auxiliary data directly onto the smart card. A user first positions the optical receiver of the smart card so that it is capable of receiving video signals from a display device. The smart card, when actuated and appropriately positioned, begins receiving video signals. Circuitry on the smart card discriminates whether auxiliary data is present in the video signals (i.e., where the video signals received are composite video signals). If auxiliary data is present, the hand-held device reproduces the auxiliary data for its use.

The preferred method of receiving auxiliary data from composite video signals when the hand-held device is a mobile phone or PDA is by detecting and electronically extracting the

auxiliary data from the video signal by use of a decoder box. The decoder box preferably receives a video signal from its source through the use of RCA jacks. The decoder box then processes the composite video signal to determine whether auxiliary data is present. The auxiliary data, when present, is transmitted from the decoder box to the hand-held device. Transmissions to the hand-held device occurs preferably through RF, so that the hand-held device need not be aimed at or physically connected to the decoder box. Although the optical transmission method is preferable for smart cards and the electrical transmission method is preferred for mobile phones and PDAs, both methods as well as other methods known in the art including through the use of vertical-blanking interval (VBI), audio subcarrier, electromagnetic subcarrier, and RF detection of video decoding, all of which are interchangeable and may be used with any of the hand-held devices of the present invention.

Among the several methods herein described may be noted a method of video interactive advertising and promotion, comprising normal television programming content modulated to contain auxiliary data, where the auxiliary data is associated with a sponsor and carries information of special significance relative to the sponsor and of special value to television viewers, distributing interactive devices of hand-held character to television viewers for their use and convenience, the devices being capable of selectively receiving auxiliary data or receiving and decoding composite video signals, providing incentives for viewers to use the interactive devices for obtaining the auxiliary data by rewarding the viewers with information of special value, the interactive devices being capable of retaining indication of having received the information, and providing redemption of the special value for users at a redemption site where users may present the interactive devices.

When auxiliary data is reproduced by use by the hand-held device, various signals, indications, display readouts, or other interactive events provide the user with a benefit according to content of the auxiliary data. The various interactive events described in Koplar, incorporated by reference herein, are usable interchangeably by and in conjunction with the hand-held devices and methods of using same with the present invention. The interchangeability includes selective use of the features of the present invention, along with selective use of any of the various apparatuses and methods of Koplar.

The design of the hand-held devices are typically in the shape and form of smart cards, palm devices, or mobile phones. Additionally, other hand-manipulable devices of a similar size

and nature that are capable of receiving and processing auxiliary data as described herein are also within the scope of the present invention and may receive data by electrical or optical methods as may be appropriate or desirable. Such hand-manipulable devices include stuffed animals or toys, snapshot-type cameras, replica sports helmets, scaled racing cars, or replica baseball bats.

Devices and methods are provided herein to allow an electronic coupon to be redeemed at a point of sale ("POS") using existing point of sale hardware and software. In addition, coupons may be configured to be used only once and with a reasonably high degree of security.

Furthermore, check out time is not seriously degraded and multiple coupons may be redeemed at the same POS with relative ease. One method of using a hand-held device at a POS, involves the user giving the device to the cashier. The cashier then locates the correct coupon or redemption value on the hand-held device using a scrolling function in combination with the LCD. The hand-held device is then held such that the LCD is facing towards the cashier and a photodetector faces the bar code scanner. The "redeem" button is then pressed, and the photodetector on the hand-held device passes over the bar code scanner. The timer in the hand-held device resets the device to non-redeem mode if a scan is not detected within thirty seconds. When the scanning laser light is detected by the hand-held device, the device beeps and a numeric code is displayed which may correspond to a stock keeping unit (SKU) number or other information regarding receipt of product shipment, inventory, and/or stocking. Other codes, including an additional numeric code such as the serial number of the hand-held device or a security code may also be displayed. The cashier then enters the numeric code or codes and the appropriate discount or value is applied to the purchase of the consumer. The timer may also delete the coupon if the hand-held device is scrolled to the next coupon, or if the device is powered down and then powered up again. The coupon may also be erased either automatically or manually by pressing predetermined buttons on the hand-held device.

The methods of data transmission as described in Broughton and Ciardullo are more complicated when data is being sent to hand-held devices via computer monitors, as opposed to other display devices such as televisions. Computers constantly refresh the screen displayed by the monitor. Therefore, modulating the video signal displayed by a monitor in real time is difficult and often impractical as a result of the constant refreshing of the video card and factors relating to the displaying of video by the computer. The present invention transmits data from the monitor to the hand-held device in a less obtrusive manner.

Various other apparatuses and methods of the present invention are set forth in the following description and claims. Similarly, other objects and features will be apparent or are pointed out more particular herein below.

Brief Description of the Drawings

FIG. 1 is a perspective view schematically illustrating use of any of several embodiments of an interactive card in accordance with and embodying the present invention.

FIG. 2A is a perspective external view of an embodiment of an interactive card in accordance with and embodying the present invention.

FIG. 2B is a perspective external view of an embodiment of an interactive card in accordance with and embodying the present invention.

FIG. 2C is a perspective external view of an embodiment of an interactive card in accordance with and embodying the present invention.

FIG. 4 is a perspective external view of another embodiment of an interactive card of the invention.

FIG. 5 is a perspective view of internal features of the interactive device of **FIG. 4** of the embodiment of **FIG. 4** showing an interactive card of the invention.

FIG. 6 is a perspective external view of another embodiment of an interactive card of the invention.

FIG. 7 is a perspective view of internal features of the interactive device of **FIG. 4** of the embodiment of **FIG. 6** showing an interactive card of the invention.

FIG. 8 is a schematic diagram of circuitry that may be used to provide various embodiments having circuit features evident in this diagram.

FIG. 9 is a schematic diagram of other circuitry that may be used to provide various other embodiments.

FIG. 10 is a perspective view of a docking station without a hand-held device.

FIG. 11 is a perspective view of a docking station with a hand-held device.

FIG. 12 is a perspective view of a decoding box.

FIG. 13E is a perspective view of yet another embodiment of an interactive card of the invention, and referred to as a sports card.

FIG. 13B is a front view of yet another embodiment of an interactive card of the invention, and referred to as a sports card.

FIG. 14 is a block diagram of other circuitry that may be used to provide various other embodiments.

FIG. 15 is a block diagram of other circuitry that may be used to provide various other embodiments.

FIG. 16 is a block diagram of other circuitry that may be used to provide various other embodiments.

FIG. 17 is an electronic/optical signal detection circuit.

FIG. 18 is a block diagram of the method of optical detection from a monitor by a hand-held device.

Corresponding reference characters identify corresponding elements throughout the several views of the drawings.

Description of Inventive Embodiments

Referring to **FIG. 1**, in a system of the invention, and in accordance with the various methods herein described, composite video signals are received and projected by a display device **10**, to be received by a first embodiment of an interactive hand-held device of the invention **12**. Display device **10** is representative of a television screen, video monitor or other video display, movie screen, computer monitor, video-converted display or video-like display, capable of receiving analog or digital video or video-representative signals from a suitable source, such as a television transmitter, a videotape, a streaming video server, a Digital Versatile Disc ("DVD"), or the computerized display representation of such a source of image content. For present purposes, it will be assumed that display device **10** is a kinescope or other conventional type of television display or monitor (which may, of course, include multiple or single-beam types of projector displays).

Display device **10** may schematically represent a video display for displaying video signals but may also be any sort of electron gun, active, array or passive array display device capable of providing not only imaged information in a visible mode but also auxiliary information (e.g., data) in a substantially transparent mode. Display device **10** may be further characterized as a computer monitor or display, as well as a portion or computer window of display device **10**. Display device **10** may also be a high definition or digital television, or other digital video presentation device. Display device **10** may vary in size, and may be small like a Sony Watchman®, or large like a movie screen or a Sony Jumbotron®. Video signals receivable by display device **10** include those delivered by microwave relay, satellite retransmission or cable, streaming and other types of downloadable or viewable computer video presentations, and those generally made available by wired or wireless methods.

Hand-held device **12** may be in the form of any type of hand manipulable device such as a smart card, cell phone, PDA, or other palm like device. Enclosure **14** of hand-held device **12** is illustrated in **FIG. 1** as taking the form of a smart card. Hand-held device **12** may be held in the palm or between the fingers of a user in the generally vicinity of display device **10**, typically within the same room and, when necessary, oriented so that front surface **16** faces display device **10**, and thereby hand-held device **12** may optically receive light from a visual representation of the video signal from display device **10**. When hand-held device **12** is a smart card and

configured to optically receive auxiliary data, it is typically is within the same room and suitably oriented so that device **10** may receive light from a visual representation of the video signal from the display device as shown in **FIG. 1**.

Hand-held device **12** is depicted in **FIG. 2A** as a PDA and show in a manner in which it may be held and used. Hand-held device **12** may include a PDA-sized housing **14** that encloses various circuits and circuit components ("Circuitry") of the device. Housing **14** may be of any hand-held shape desired that is functional and hand manipulable, examples of which include a PDA (as shown), cell phone, PCMCIA card, snapshot-type camera, replica sports helmet, replica baseball bat or football, or scaled racing car.

On front surface **16** of hand-held device **12** above LCD **44** is imprinted the brand name of a sponsor **17**, and possibly information or indicia that may induce a user to associate device **12** with sponsor **17**. When hand-held devices **12** are inexpensive to manufacture, such as when they are in the form of smart cards, sponsors **17** may be found with higher frequency. However, when hand-held devices **12** are a user's personal device such as a cell phone or PDA that have primary uses other than receiving promotional opportunities, such indicia may not be less frequently included. Sponsor **17** may be a company providing the hand-held device **12** to a user of its service, such as a hotel, phone company, PDA service, or place of business, that uses device **12** for access, privileges, and/or rewards. Sponsors **17** may also include various entities such as advertisers, Internet websites, television shows, other occurrences, programs or events, for which use of hand-held device **12** will provide means for a user to obtain promotional opportunities.

Hand-held device **12** as illustrated in **FIG. 2A** to have both RF antennae **68** and lens **36** so that device **12** may receive auxiliary data by both optical and electrical means. When hand-held device **12** contains such reception means, it may be used with various promotional opportunities in various locations. Thus, with the present invention, a user may receive auxiliary data on hand-held device **12** at a game inside a stadium or arena electrically via RF antennae **68**, and may also receive auxiliary data while watching a game at home optically by positioning front surface **18** towards display device **10** (as shown in **FIG. 1**). Users may thus participate in promotional in multiple locations using the same hand-held device **12**.

Button **22** of hand-held device **12** preferably provides means for selecting between receiving auxiliary data via electrical means (such as through RF antenna **68**) or by optical means (such as through lens **36**). Preferably, the user, based on their location, will select the

means by which they wish to receive the auxiliary data thereby saving power and preventing user from receiving undesirable auxiliary data. However, hand-held device **12** may be configured to monitor the data input means to determine whether auxiliary data is being transmitted by any of the methods described herein.

As shown in **FIG. 2B**, a leading edge **18** of hand-held device **12** is outfitted with lens **36** to provide means for receiving auxiliary data. Visible from front surface **16** of hand-held device **12** is LCD **44** and four light-admitting diodes or other electro luminescent light sources **20a**, **20b**, **20c**, and **20d**. Depending on its desired promotional use, hand-held device **12** may included both LCD **44** and lights **20a**, **20b**, **20c**, and **20d**, one of the foregoing, or neither. Hand-held device **12** may have various users controls as described in Koplal, which may include a keypad or touch screen (not shown) to allow user input for specific functions and additional uses.

Hand-held device **12** is depicted as a smart card in **FIG. 2C** in a manner in which it may be held and used. Hand-held device **12** includes a credit card or wallet-card-sized housing **14** that encloses the Circuitry of device **12**.

A leading edge **18** of hand-held device **12** may include a lens or small aperture **36** to admit video signals to a photosensor **30** within housing **14**, as is described herein. Visible from front surface **16** of hand-held device **12** are a plurality of light-emitting devices **20** which may be light-admitting diodes (LEDs) or other electro luminescent light sources, including, for example, regions of a LCD of either active or passive type.

A typical manner in which hand-held device **12** is used to optically receive auxiliary data is as follows: A user watches a television presentation such as a commercial, television program, movie, or other video-displayed program. When such a presentation is displayed, the user may then hold hand-held device **12** device as shown in **FIG. 2B** or **2C**, depending on the type of device **12** used. The user then positions hand-held device **12** so that leading edge **18** of device **12** will be positioned for receiving video signals from display device **10**. Hand-held device **12** or display device **10** may have indicia informing the viewer to press the pressure membrane or button **22** at a preferred time, such as when a commercial of a sponsoring entity appears. Although the term "button" is used herein, it is considered to include membrane switches, pressure or touch regions capable of activation and carrying out the function of button **22**. When the user presses button **22**, the video signal will be detected and received by a photodetector (the process to be described below) within housing **14**. The composite video signal comprises a

video signal modulated with auxiliary data, in accordance with the teaching of the above-referenced Broughton and/or Ciardullo each of which are herein incorporated by reference. A discriminator, implemented by Circuitry determines whether auxiliary data has been transmitted along with the video signal of the presentation.

A typical manner in which hand-held device **12** is used to electrically receive auxiliary data is as follows: video signals are sent to and received by a decoder box **82** as shown in **FIG 12**. Decoder box **82** discriminates the auxiliary data and transfers it to hand-held device **12** by RF or by other means, such as IR, a computer port, or direct wire connection. Decoder box **82** may otherwise receive the data through other methods such as through use of a super VHS, fire wire, or coaxial jack, or may be connected to an RF antennae, integrated into the circuitry of a display device, or otherwise connected so that the decoder box receives the video stream. As may be observed in **FIG 12.**, decoder box **82** contains antenna **84** so that it may transmit RF signals between it and the hand-held device, RCA jacks **86**, and a network interface jack **88** so that it may be connected with a computer network or directly to a computer.

An appropriately outfitted decoder box **84** may receive transmissions from other means including IR and direct connection through a computer interface such as a PCMCIA. Decoder box **84** may also function as a two-way device, so that it may receive feedback from the hand-held device. The decoder box may, with a graphics rendering unit such as a Scorpion processor, display information received from the hand-held device on the display device. The decoder box may contain network access, which may supplement or replace the need for network access on the hand-held device. The decoder box may also contain means to control peripheral devices, such as a VCR. Users, upon receipt of information such as a television schedule on their hand-held device, may transmit a request to the decoder box or VCR to schedule the recording of a television program.

Alternatively, the received video signals may be sent through an interface of hand-held device **12** to a computer or computer-like device where the discrimination of auxiliary data may be implemented in the computer's hardware or software. The computer interface apparatus and method of using same is described in Koplár.

If the discriminator determines that the transmitted video signals contain auxiliary data or auxiliary data is received, the circuitry of hand-held device **12** may then cause an audio transducer **34** (as shown in **FIG. 5**) present on the printed circuit board to sound a tone or

“beep”, providing assurance that the auxiliary data has been received satisfactorily. A suitable aperture may be provided on the front or rear surface of housing 14 to allow sound to pass from audio transducer 34.

Hand-held device 12 may contain more advanced means of providing sound to a user. Hand-held device 12 may contain advanced sound circuitry to enable device 12 to play digital audio, including popular audio formats MP3 and MIDI. The sound is preferably preset on the hand-held device 12. However, sound may also be downloaded to or prerecorded on hand-held device 12 and configured such that when an event occurs for which a sound is desired, the event triggers the Circuitry of device 12, which causes a sound to be transmitted through audio transducer 34 or other hardware (not shown) designed to play sounds. Hand-held device 12 may also be configured to play sounds upon user demand, such as when user actuates button 22.

Hand-held device 12 may also be configured to initially prohibit user from taking advantage of prerecorded or preset sounds or promotional opportunities so that sounds or promotional opportunities are unavailable to the user. The hand-held device 12, upon receiving specific auxiliary data which directs device 12 to unlock the sounds and promotional opportunities so that the opportunities are available to the user. The sounds and promotional opportunities may then be available to the user for a limited time or indefinitely.

An additional feature of the present invention is that hand-held devices 12 may coordinate their sounds. Once the sounds are available for use on hand-held device 12, users may perform the sounds as per the desired promotional event. Through use of the computer interface port as described in Koplar, or other communication means such as IR or RF, a hand-held device 12 may synchronize songs with other hand-held devices 12 and other peripheral devices by transferring and receiving information and triggers from the various devices.

The Circuitry may also cause operation of one or more of lights 20a, 20b, 20c, and/or 20d of FIG. 2B or FIG. 2C, to indicate a value that has been received. By outfitting hand-held device 12 with lights 20a, 20b, 20c, and/or 20d, device 12 is capable of providing promotional opportunities in the methods described in Koplar.

FIG. 4 illustrates features of hand-held device 12, including the provision of aiming light 24 on front surface 16 of device 12. Aiming light 24 is typically included on embodiments of hand-held device 12 where video signals are optically received by device 12, such as to indicate that device 12 is positioned such that it is capable of capturing video signals emanating from a

display device 10. When button 22 is pressed while the leading edge 18 of hand-held device 12 is generally oriented toward display device 10, received composite video signals on device 12 cause illumination of aiming light 24 to indicate that video signals are being received. Aiming light 24 illuminates for so long as data is being received, for a predetermined period of time sufficient to indicate that hand-held device 12 is oriented or aimed correctly, or for a long enough time period as to enable the encoded signals to be received by device 12. Aiming light 24 may be included on embodiments of hand-held device 12 where the video signals are electrically received to alert the user that auxiliary data is being received, such as through IR, RF, or the computer interface.

Referring to FIG. 5, the internal features of hand-held device 12 are illustrated. The features may be seen to include a printed circuit board 26 having integrated circuits 28 including push-button 22 and aiming light 24. Circuit board 26 is shown to include photocell 30. Photocell 30 is oriented so that it may receive light through a suitable aperture 36 (not shown) along leading edge 18 of hand-held device 12, which aperture 36 may be at locations as shown in FIG. 2A and 2B. Circuit board 26 is powered by one or more batteries 32 or other suitable cells (not shown), intended to provide sufficient power for operation of hand-held device 12 for days, weeks, months, or years. Batteries 32 may be used with other similar sources of portable power, such as solar cells 33 (as shown in FIG. 8). It will be appreciated in the art that the electronics of a PDA, cell phone, or other computer-like device capable of processing auxiliary data as described herein may contain a significant amount of additional circuitry to provide functionality unrelated to the present invention.

Three lights 20 are shown present on circuit board 26, and they may take the form of LEDs. However, as will be understood from study of FIG. 14, circuit board 26 may include the capability for more than three such lights. For example, it may include circuits for energizing up to nine LEDs.

Referring now to FIG. 6, an embodiment of hand-held device 12 is shown to include LCD 44. LCDs 44 capable of presenting the graphic content in monochrome or color are preferably used. However, LCD 44 may also be a textual display consisting of 16 digits, but less or more display capability may be provided based on usage and need.

Hand-held device 12 has power button 38 which when depressed will initiate operation of LCD 44 to display a coupon, a prize notification, or other information indicating receipt by

device 12 of auxiliary data. For example, LCD 44 may be used to display a first coupon in a circularly linked list of offers. Power button 38 may also be held to initiate receiving video signals, or may be used for other display or control purposes separately from button 22. Scroll button 40 allows a user to traverse, i.e. scroll, information retained or received by hand-held device 12, for example, the circularly linked list of offers received and stored on device 12. It will be appreciated in the art that any of the various buttons 22, 38, 40, or 42 may be implemented by using other "pre-existing" buttons (i.e., with other functionality) on hand-held device 12, such as the numbered buttons on a cell phone or shortcut buttons on the PDA. It will furthermore be appreciated that these buttons 22, 38, 40, or 42 may be implemented via touch screen, such that physical buttons 22, 38, 40, or 42 may be implemented "virtually" on hand-held device 12. Expiration button 42 acts in the manners disclosed in Koplar. Offers received by hand-held device 12 may be indicated not just by illuminating lights 20, but by textual information and graphics displayed on LCD 44 as may be observed in FIG. 6.

FIG. 7 shows circuit features of the card embodiment of hand-held device 12 without housing 14. LCD 44 is evident, as are controls 38, 40 and 42, and a pair of batteries 32 located on the right side of the circuit board.

FIG. 8 shows a chart of an alternate embodiment of hand-held device 12 having an input-output means preferably in the form of a Personal Computer Memory Card International Association ("PCMCIA") interface, such as may commonly be found on a laptop computer. PCMCIA interface 70 of hand-held device 12 connects with PCMCIA connector 72 of a computer or computer-like device to transmit information back and forth. Connections with PCMCIA interface 70 to a computer are preferably made by a PCMCIA port, but the connection means may also be other known computer and computer-like slots, connections, and ports such as Ethernet, Token Ring, infrared ("IR"), RF, Small Computer System Interface ("SCSI"), Universal Serial Bus ("USB"), parallel port ("Parallel"), serial port ("Serial"), IEEE 1394 FireWire ("FireWire"), S/PDIF, AES/EBU, fiber optical cable, and Apple Desktop Bus ("ADB"). Hand-held device 12 may also utilize portable data storage, such as flash memory, mini-disc, or stick memory, to manually transfer information from hand-held device 12 to a computer. The types of connections used in various applications of hand-held device 12 may vary based on factors including cost, transfer speed, acceptance by industry, and user preference. Implementations of hand-held device 12 incorporating PCMCIA interface 70 and their methods

of use are disclosed in Koplar and may be interchangeably used with the present invention.

FIG. 9 is another embodiment of the hand-held device **12** with an input output interface in the form of a PCMCIA interface **70** and docking station **76** as shown. The docking station **76** may receive discriminated auxiliary data or composite video signals, and transfer either to hand-held device **12** by PCMCIA interface **70**. Alternatively, as shown in **FIG. 10**, docking station **76** may contain photocell **30** so that it may be used to optically detect the video signal from a display device **10**. Then either the entire video signal may be transferred to hand-held device **12** so that device **12** can discriminate the auxiliary data, or the docking station **76** itself can discriminate the auxiliary data and transmit the auxiliary data to device **12**. The data may then be transmitted to hand-held device **12** by IR, RF, or by PCMCIA interface **70**. **FIG. 11** illustrates a manner in which hand-held device **12** may receive auxiliary data from docking station **76**.

Referring back to **FIG. 9**, docking station **76** may charge battery **22** of hand-held device **12** by its battery charging control **80**. Docking station **76** may implement various hand-held device **12** functions and advanced device **12** functions by controlling microprocessor **50** through interface drive **78**.

Turning to **FIG. 13E**, a version of hand-held device **12** which may be termed a "sports" device **12S** is shown. It includes housing **14** which is provided with front surface **16** which may include a visual field **54** for bearing the image of a sports contestant. In addition, LCD **44** is provided together with button **22** which allows a user to initiate operation of hand-held device **12**, preferably with an RF antenna **68** oriented for receiving RF signals, or alternatively for optically receiving composite video signals through photocell **30** (as shown in **FIG. 2A**), such as by holding hand-held device **12** so that leading edge **18** is generally towards display device **10** presenting a program relating to the sports celebrity or other person depicted on display device **10**. Sports device **12S** may be outfitted, configured, and used in the manners described in Koplar and herein

For example, as a celebrity batter takes his turn during a baseball game, television viewers direct their sports device **12S** at display device **10** to receive composite video signals, or preferably configures their device so that they may electrically receive the auxiliary data. In both instances, the viewers receive real time statistics about their favorite athlete during the telecast via sports device **12S**. Additionally, the users of sports device **12S** at a live sporting event may

receive auxiliary information without the use of display device **10**, such as by RF or IR. Thus, sports fans may get live statistics and trivia through use of their hand-held device **12** while they watch the game live and at home. Fans with obstructed views or sports fanatics may obtain additional information and have fun while enjoying a live sporting event. The information received by sports device **12S** may take many forms including, as noted, statistics such as batting average, home runs, or other personalized information about the player that is stored in device **12** for future reference or updating. An example of such presentation is shown in **FIG. 13B**. The stored information may then conveniently displayed on LCD **44** for the device owner by the push of scroll button **40** or update button **56**, or otherwise transferred through a PCMCIA interface **70** to a computer.

Use of sports device **12S** in connection with a baseball game is merely illustrative. Other sports in which players have statistics which change during play, over a year, or which may include information unique to the player, such as hometown or previous teams, may similarly be downloaded or conveyed by device **12S**. Sports device **12S** may also be used in connection with concerts and other special presentations. Users may acquire useful information about the concert or special presentation, such as the names of performers, set lists, the venue location and history, and related Internet addresses through receipt of auxiliary data on device **12**. Persons with hearing impairments may receive real time text of live speeches on hand-held device **12**. Sports device **12S** may be used to receive information relating to monuments, buildings, cars, animals, etc. during the course of a live or video presentation, wherein the transmission to device **12** contains auxiliary data.

Hand-held device **12** may also be used in trivia applications as follows: The user watches a trivia game show, such as the television show "Who Wants to a Millionaire?" The user may play along by utilizing hand-held device **12**. The question is downloaded and received by hand-held device **12**, either during the broadcast or prior to the broadcast, by use of auxiliary data and the methods described herein. The questions are synched to display device **10**, such that when display device **10** first presents the questions, the auxiliary data triggers hand-held device **12** to display the question and possible answers. The user chooses the correct answer, or places the answer in order in a timely manner, or must otherwise comply with the rules of trivia game request in a similar manner to that of the contestants. The user receives points or credit for the correct or timely answer, based on various factors which may include the number of other at

home users who answer correctly or speed of answer. The percentage of at home viewers either nationwide, local, or by other area may be displayed in real or delayed time either on display device 10, Internet website, or on hand-held device 12. Users may achieve regional or national rankings based on their performance. The final results from the various games may then be stored at a central database. Users who score high may receive recognition, a prize, or an option to play in a future televised game.

Hand-held device 12 may also be used other trivia applications as follows: User takes hand-held device 12 and appropriately configures it to receive modulated video from display device 10. During an event, such as the "Grammys", performers appear on the screen and perform a song. The user is then notified that a promotional opportunity is available, either through display device 10 or hand-held device 12. This preferably occurs as modulated video triggers a graphic rendering unit in decoder box 82, creating an icon to appear on display device 10. (Thereby not appearing on display device 10 of people who do not have such a unit.) Hand-held device 12 provides the user with an opportunity to purchase a song or album on which the performers appear. The money for the purchase may be made through online automation or a third-party Internet website, or may be entered or taken from a website. Alternatively, if the user so desires, an order requiring final approval and payment information can be sent to the user e-mail address. The user may then purchase the music in the following manners: directly, through a third party's website such as the affiliate program at "CDNow", or directly from the manufacturer. Otherwise, a link for the special purchase can be sent to the user's preferred e-mail address. Bonus or additional rewards may be sent along with the purchased product such as a bonus disc with previously unreleased material, live songs or videos, or future product discount. The user may choose to have the song sent in appropriate digital format to their e-mail account, or the selected song may become available for a period of time at a website for the user to download. Finally, the song could become part of a list that, when full to the length of a CD, the CD is automatically created and sent to the user. It will be appreciated in the art that this method of purchasing may be used with any other similarly sold products (such as jewelry on the "QVC network").

Another example of this technology is as follows: Any participatory game shows produced for television distribution, whether produced and distributed for broadcast, cable, direct satellite, or close circuit transmission; whether distributed by means of home video or DVD may

be encoded with auxiliary data enabling viewers of programming material to decode either optically or electronically; process, store and display the data on hand-held device 12 for the purpose of winning prizes or accumulating points. Participatory type games include: (1) Games revolving around trivia questions dealing with subjects such as sports, music, news, movies; (2) Games revolving around Multiple choice questions; (3) Games dealing with true or false/ yes or no type questions; (4) Games dealing with guessing letters; and (5) Games dealing with question revolving around Who? What ? Where? When? How? or Why?

The viewer of display device 10 participates remotely either at home, at a public establishment such as a restaurant or bar, or in a hotel room, all by means of any properly outfitted hand held device 12, including smart cards, PDA type devices, electronic decoding boxes, cell phone or wireless handset. As the answers are decoded processed and stored in hand-held device 12, the viewer then chooses a response to the questions by depressing from a choice of buttons the correct answers. In case of devices with LCD display 44 such as the PDA's, cell telephone, or wireless handset, the choice of answers might be display on LCD 44. By touching the choice with a stylus, pointer or finger, the answers are pre-defined by the televised show in determining the correct answers. Accumulation of winning answers are tallied within in the remote device and displayed by a numeric tally. Answers may also be in the form of an alphabetical display.

Point accumulation or winning combinations are then redeemable for various levels of prizes, and are redeemable by a program's sponsor at point of sale, through the computer or computer interface, or by the programs fulfillment process.

Thus, in the case of a national televised trivia contest, participants go to various sports bars where they are issued a play-along game piece. During the televised game, participants in the various sports bars across the country compete by guessing the correct answers and tallying points not only against each other, but also the studio contestants on the shows. The winning cardholder may be awarded a cash prize or other consideration including a possible appearance on the television show. The redemption may occur through hot syncing his card to the programs web site, to a sponsors retail site, or other means of fulfillment. It will be appreciate in the art that this application may be utilized by any of the hand-held device embodiments described herein or with Koplar.

In FIG. 14 a schematic circuit diagram of one form of circuitry that may be used to

provide the features and functions of the several embodiments described herein, elements are identified by their conventional numerology conventional characters proximate of the elements. Optional photosensor 30 is seen to be constituted by a photodiode or phototransistor Q2 which provides the signal to amplification and filter circuit consisting of an operational amplifier U1A including a circuit consisting of the components of C1, R19, R18 and C12 interconnected between the output and the inverting input of operational amplifier U1A, and so providing an amplifier and filter. Thus amplifier and filter signal is provided through R15 to a filter and frequency shaping circuit comprising of an operation amplifier U1B having in its feedback circuit the components C10, C11 and R16. These circuits provide a filtered, frequency-shaped output through a resistor R5 through a circuit consisting of operational amplifier U1C and resistor R11. Operational amplifier U1C has an output coupled to a diode pair D11 which thus provides a pair of outputs, the upper to a circuit comprising an operational amplifier U1D, providing in effect a buffer whose output is a data signal delivered through a resistor R20, and the lower of the diodes D11 providing a signal through a resistor R1 to a further resistor R7, across which is a capacitor C3. The node between resistors R1 and R7 provides 16kHz signal that is of the horizontal line scan rate or frequency television display optical signals received by photosensor 30 (Q2). The horizontal scan frequency of conventional NTSC color signals is, more precisely, 15.625kHz. (approximately 16kHz, as here described). Similarly, the discriminator circuitry provides at the output of operational amplifier U1D an 8kHz signal representative of the auxiliary data received, as produced by alternate-line luminance modulation of the display. The discriminator circuit thus described provides both the 16kHz and 8kHz (more precisely, 7.8175kHz), which constitutes the actual data, and determines whether the 8kHz data carrying the information (data) content of the received auxiliary data is present by determining whether average signal magnitude of the 16kHz or 8kHz signals is greater, so that if auxiliary data is present, i.e., there is 8kHz modulation energy in the received light signals, they are provided to a microprocessor of the U2 of the circuit for decoding the information content within the 8kHz signal. Thus, the received composite video signal is amplified and filtered to de-emphasize the 16kHz signal and retrieve the 8kHz signal carrying the data. I.e., wave shaping and frequency shaping filter circuits provided by operational amplifiers U1A & U1B de-emphasize the horizontal retrace frequency and amplify the half-frame rate carrying the data content of interest. The circuits filter the frame rate signal and use it as a reference to compare

its relative signal magnitude against the 8 kHz data-carrying signal. If the retrieved 8 kHz signal is of greater magnitude than the conditioned 16 kHz signal, auxiliary data is present and may be utilized by the processor. Microprocessor U2 is preferably of commercially available type Z86E02, and operates according to machine instructions stored in its resident ROM memory. Flowcharts of the functions performed by the machine instructions are set forth in the appendix. Although not separately shown microprocessor U8 includes random-access memory (RAM or DRAM) in which decoded data is stored. Thus, microprocessor U2 is to decode and store, or store indication of, the data present in the 8kHz signal, as by illuminating one of more of the LEDs and causing them to remain on as evidence or indication of the data, substantially in accordance with the teachings of Broughton, and to drive displays of the device and/or its LEDs or other signal devices, as well as to provide any audio function, as well as also to energize an aiming LED7 when auxiliary data is present. So also, if desired, a signal may be driven by U1 in response to the presence of the auxiliary data, thus providing an aiming light function indicating, in simple effect, that the hand-held device is receiving composite video signals.

For providing illumination of lights **20** or **20a-20d** described above in connection with the various embodiments, shown here are nine LEDs D9-D18. It will be understood that not all of these LEDs need be used for a specific embodiment of hand-held device **12**. That is, the circuit may be configured so as to drive one, two or three or more of the LEDs as according to the desired function and use of the device.

Shown adjacent microprocessor U2 are two diodes D15 and D20 which are used to bypass any noise generated from the microprocessor. The speaker SPK1 is element 34 shown in **FIG. 5**. A clock crystal XTAL1 provides 8MHz clock signal to microprocessor U2. Capacitors C8 and C9 are part of the clock circuit.

Immediately adjacent the clock circuit is a switch S1 to provide the function of button **22** in the several embodiments for initiating operation of the device. Switch S1 is tied to a power supply circuit comprising power cells a resistor 14, V2 and V3 (each of 1.5v potential), and a resistor 14, and including a switched analog power circuit comprising a transistor Q1 and resistors 12 and 13 which enable power to be provided to the array of LEDs D8-D18.

Referring to **FIG. 14** there is **FIG. 15** another version of circuitry invention is shown which may be used to provide still other embodiments of the hand-held devices of the invention. It includes a microprocessor U2 which may of commercially available type Z86X08. It is

similarly provided with 8kHz and 16kHz signals (more precisely 15.635kHz and 7.8175kHz) which respectively constitute the horizontal retrace signal and the data signal at half of that frequency, since the auxiliary data encoded on alternate horizontal lines and so is effectively present at only half the horizontal scan rate, as explained above. These signals are identified as VEILA and VEIL REF that are provided as inputs to microprocessor U2. Therefore, it will be understood that operational amplifier circuits consisting of operational amplifiers U1A, U1B, U1C and U1D provide the same functions of amplification, filtration, frequency shaping and discrimination, as well as buffer circuits described in **FIG. 14**. The microprocessor, clocked by crystal X1 at 8MHz, decodes the data provided by the composite video signal, stores it in internal RAM or DRAM and drives an LCD **44** illustrated as circuit component LCD1 which may be, as shown, a 16-character by 2-line display. It may instead be a 12-character by 3-line display, for example, or other format appropriate for the display message to be presented at the surface of the device.

Power for the circuit is provided by two cells BT1 and BT2 of 3 volt potential to a circuit including Q2 to provide not only main power by auxiliary power, the later being delivered to the microprocessor for maintaining its continued operation, such as for date and time keeping even when the display is not being operated and collectively referred to as battery **22**. A switch S1 is provided for performing the function of power button **38** (as shown in **FIG. 6**) in the several embodiments and, when pressed, enables power to be provided to the LCD1 and other switching functions may be provided by switches S2, which controls scrolling of the LCD **44**, and switch S2 may be actuated by scroll button **40** shown in **FIG. 13E**. Similarly a switch S3 provides a date function that may be actuated by expiration button **42**. These signals control inputs to operational amplifiers U3A and U3D, respectively, and these are provided as inputs to the operational amplifier and also to LCD1. The clear switch will, when operated as described above clause clearing of the date, and the scroll switch enables the user to cause the message across the LCD **44** as that in **FIG. 6**. Operational amplifiers U3C and U3B provide voltages useful according to the connection illustrated.

The circuit embodiments shown are used in conjunction with a method for producing a composite video signal containing video program material and control data, and displaying the signal on a television and decoding such control data for ancillary use, wherein the method includes modulating at least one video field within the viewing area of a television in such

manner that the modulation is substantially invisible to the television viewer, thereby producing a video subcarrier component of the signal (which is as indicated detectable at an 8kHz rate) containing the data; and detecting the component to reproduce the data for the ancillary use. Although luminance modulation is particularly useful for that purpose when using hand-held devices in accordance with the invention, chrominance modulation may instead be employed as according to Broughton. Furthermore, the improvements in modulation described in Ciardullo may likewise be used. Various alternative modulation (and corresponding modulation) schemes may be employed as alternatives, including (but not limited to) amplitude shift keying (ASK), frequency shift keying (FSK) modified frequency shift keying (MFSK), and phase shift keying (PSK). And although the substantially 8kHz data-carrying submodulation is at half the NTSC horizontal scan rate, other submodulation techniques may be used at other multiples or submultiples or other periodic rates which are other functions of the horizontal scan (retrace) rate.

FIG. 16 is a block diagram of circuitry of yet another possible embodiment of the interactive hand-held devices, designated **12F**, which shows discriminator and microprocessor circuits **50** which are in accordance with **FIGS. 14** or **15**, and receiving composite video signals by photosensor **30** so as to decode the auxiliary data and provide either light signals as described above, or, preferably, to drive LCD **44** according to the foregoing description. Thus, it includes an update or initiating button **22**, as according to the sports device **12S** and which begin the process of optical detection. In addition, an FM receiver **62** and associated antenna **64** (collectively seen as RF antenna **68** in **FIG. 2A**) may be provided as a surface-mount module added to the printed circuit board of the device. FM receiver **62** and associated antenna **64** may be of commercially available design, suitable for being powered by battery **22** or cells (not shown) provided in accordance with the foregoing description of various embodiments. Control button **66** may optionally initiate operation of FM receiver **62** so that it sends FM-demodulated signals to microprocessor circuits **60**. The FM receiver **62** be any type of RF antenna that is of the size and accordance with the invention, such that the discrimination may take place on a decoder, and the results are sent to the hand-held device **12** via RF.

Hand-held device **12F** may be sports device operating otherwise according to version **12S** described in relation to **FIG. 13**, but the addition of FM receiver **62** gives the new device the capability of being used in sports stadiums and other performance venues where video signals

are not available. Thus, the device **12** may receive either optical signals or electrical signals. In the case of a sports device according to **FIG. 13**, the user may as described above receive statistics about a player depicted on the device, or about a player at bat. According to a preferred method of using device **12F**, the same auxiliary information as would be transmitted via a television broadcast for being received on a display device **10**, there to be displayed as composite video signals, is in addition transmitted by low-power FM signals in the FM broadcast band of 88-108 MHz. For this purpose, FM receiver **62** may be pretuned to an appropriate frequency for such low-power signals. The FM signals may include batter statistics, for example, as batters come to bat, so that holders of the new devices **12F** may update their devices as their preferred batters come to bat.

Hand-held devices **12** may have use in various sports events, entertainment presentation, conventions, museums, tours, and guided events at which holders of devices might not conveniently use them while in the presence of a television display carrying auxiliary data, but where the location in which the devices will be used will permit low-power FM or other RF signals. Other commercially significant usage of the devices of **FIG. 14** can be made, similar to the methods of using the previously described versions. Similarly, hand-held devices **12** may be adapted to receive AM signals, or auxiliary light signals such as IR (infrared) light signals, different from the composite video signals.

Similarly, hand-held devices **12**, whether or not sized as "cards", PDAs, or cell phones or other conveniently hand-held size, and whether in the form of racing devices, may simulate other objects, vehicles, personalities, or devices for house-hold, personal or business use, so as to provide a verisimilitude or facsimile representation of such devices or usage, so that the hand-held device suggests to the user the manner of its use, or conveys to the users special feeling, sense, identity or association with a field, activity, sport, entertainment or other use of the device it represents. In games, for example, in which some or all of the information content useful in the game may be provided by auxiliary data, hand-held devices of the invention configured to provide a verisimilitude or facsimile representation of such devices or usage may give players of the game enhanced sense of play, participation or gaming identity. The foregoing are merely illustrative of the many possibilities.

When used in a system for deriving benefit from encoded data including means for producing video signals modulated with auxiliary data, such as by providing commercially

sponsored television programming including auxiliary data, hand-held devices 12 of the present invention have special impact for television response, advertising and promotions, as the new system and devices are useful in providing, among others, the following commercially advantageous results when they are distributed to viewers and used by viewers to receive auxiliary data transmitted with normal programming content, which may include advertising, promotions and other sponsored transmission.

Another feature of the present invention is the desire to have an improved method of redemption for hand-held devices 12. A method for hand-held device 12 redemption is described in the context of an optically loaded card 12O. However, such a method could also be employed with other hand-held devices 12 that have coupon redemption requirements. The components of an electronic couponing card 12O which support the method for card 12O and value redemption include:

- 1.) LCD 44 or other human readable method to display data,
- 2.) On board computation to sequence the logic defined below,
- 3.) A method to load "electronic coupon" information onto card 12O,
- 4.) Buttons 22 or other method (such as a touch screen) to sequence through the coupons loaded on card 12O,
- 5.) Button 22 or other method (such as a touch screen) to put the card in "redeem" mode, and
- 6.) Laser detection hardware described below.

Presently, most POS systems use a computerized cash register tied to inventory management software and bar code scanning hardware. One embodiment of a method of using an electronic coupon card 12O and existing hardware and software located at a POS for electronic coupon redemption is described in the following steps:

- 1.) Coupon data is encoded onto a video signal, e.g. television signal. The encoded data also contains additional text describing the coupon along with a numeric code to be entered at the POS.
- 2.) The user points the multi-use card 12O at the television screen when the television signal containing the coupon data is airing. The electronic coupon data is then captured by card 12O by optically receiving the data that is presented on the display. The coupon data could also be captured with methods other than optical detection,

including but not limited to radio frequency (RF) or hard-wired electronic data transfer.

- 3.) After capturing the electronic coupon data, the user can then view coupon information such as requirements, valid dates, valid POS locations, etc. on LCD 44 of card 12O. (Other numeric codes described in the following steps that are used for identification and security purposes are not available for viewing by the user at this time).
- 4.) When the user desires to redeem the electronic coupon, card 12O is transported to a POS and the user buys the desired item or otherwise follows the requirements of the coupon offer.
- 5.) At the check out, the cashier takes card 12O and locates the correct coupon using the scrolling function (usually a button) of the card 12O, in concert with viewing the data on LCD 44.
- 6.) The cashier then presses the required "redeem" button on the card. The cashier then has approximately one minute to complete steps 7 and 8 below. Requiring this button to be pressed reduces the likelihood that a coupon will be accidentally redeemed through bright ambient light.
- 7.) When the correct coupon is located, the card is held with LCD 44 facing the cashier and the back of the card facing the bar code scanner located near the cashier. The bar code scanner is the same scanner that is used for purchases and conventional paper coupon redemption.
- 8.) When the scanning laser light is detected by card 12O, the card beeps and the numeric code described in step #1 is displayed on LCD 44. In addition, another code that represents the serial number of card 12O is also displayed. The second number displayed may also be a special code generated as a combination of the downloaded numeric value (step #1) and a hidden internal (to the card) serial number. The second number can be generated by various standard encryption methods and may be used to increase the security of the transaction because it would uniquely identify card 12O and transaction but would not be easily duplicated.
- 9.) The cashier then has 30 seconds to enter either the numeric code only or both the numeric code and card serial number (for greater security). After 30 seconds, card

12O automatically erases the coupon. The coupon may also be erased quickly by a press of the “redeem” or “scroll” keys during the 30 second period. (The scroll key is used to allow multiple coupons to be located and redeemed efficiently as described below).

- 10.) If additional coupons are to be redeemed at the same time, the above steps are completed for the first coupon. Additional coupons are redeemed with the cashier repeating steps 5 through 9 above.

In an alternative embodiment, steps 8, 9, and 10 are replaced with the following steps:

- 8'.) When the scanning laser light is detected by card 12O, card 12O beeps and displays a numeric code, or alternatively an alphanumeric message, on LCD 44. In addition, another code that represents the serial number of card 12O is also displayed. The second number displayed could also be a special code generated as a combination of the downloaded numeric value (step #1) and a hidden internal (to the card) serial number. The second number can be generated by various standard encryption methods and could be used to increase the security of the transaction because it would uniquely identify the card and transaction but would not be easily duplicated.
- 9'.) The cashier, upon viewing the number code or alphanumeric message, can determine whether or not the triggered card is the card that was pre-selected to win a prize or to receive a special value or discount. If the card alerts the cashier that a prize has been won, the cashier may optionally enter the second number (step #8b) into a database to verify that card 12O has not been tampered or altered. The prize may also be erased quickly by a press of the “redeem” or “scroll” keys during the 30 second period. (The scroll key is used to allow multiple prizes to be located and redeemed efficiently as described below).

The following describes how detection of a laser scan across the card can be accomplished: Almost all bar code scanning devices use a red laser of either the helium neon (HeNe) or diode types. The scanners deliver an extremely bright light in the 832.8 nanometer (nm) wavelength for the HeNe or 640nm wavelength for the diode lasers. The wavelength spread for a laser is extremely small, which allows for narrow optical filters so that non-laser ambient light can be filtered out. A simple electronic/optical circuit is shown in Fig. 17 and can be used to detect the signal.

As shown in **FIG. 17**, electronic/optical circuit **100** includes optical filters **120a** and **120b**, load resistor **140**, microprocessor trigger **160**, and phototransistor **180**.

Optical filters **120a** and **120b** are used to prevent the electronics of the card from being triggered by ambient light, e.g. bright sunlight. Optical filter **120a** is a neutral density type to reduce the intensity of light and optical filter **120b** is a red bandpass type.

A photodetector is required to detect the laser light. This detector can be phototransistor **180** since only an ON/OFF signal is required. Phototransistor **180** has a small resistive load on it, as represented by load resistor **140** so that phototransistor **180** is less sensitive to light. Load resistor **140** therefore reduces unwanted triggering.

The output of electronic/optical circuit **100** is fed into a microprocessor on the card where the output then becomes the trigger that causes the beep, etc. as described in the above steps.

There are complexities when encoding signals in real-time video displayed by monitors, such as with computer monitors. As described in Ciardullo and Broughton, the substantially invisible signal methods encode with one video display line brighter and one line dimmer throughout the entire monitor. Using a constant stream of encoded video content with computers requires low-level devices drivers that are difficult to coordinate with the computer operating system and the video card that it controls. Monitors, unlike traditional televisions where the video content is formatted prior to its reception, generate the video content at the operating system level, such as with Microsoft® Windows™, by use of a video card. It is therefore difficult to control the display of a computer monitor unless the video data is generated from an application program that makes calls to the operating system to display requested data.

The present system utilizes computer software and hardware including the operating system, application program, video card, and monitor, as well as a hand-held device to receive data by the user. Under the present system, the application program needs to be executed so that it will begin to transmit its data. The preferred method to imitate an application program is to trigger the start of the application program on specified user interactions with Microsoft® Internet Explorer™ or similar web browsing software. When users interact with their web browser by moving the mouse and clicking or double-clicking, the web browser can selectively execute the application program on specified events. The application program is stored as a dynamic link library (DLL), such that the web browser can call and initiate the DLL on events where the web browser determines that it needs the DLL file. Installation of the DLL plug-in

prior to initiating the present invention will be required so that the web browser can call the application program. When a user attempts to provide interactions to their hand-held device for the first time by utilizing the web browser and the appropriate web site will perform an action that requires calling the application program. The user will then be prompted by the web browser for the users permission to download and install the DLL. After installation of the DLL, the action that the web browser wanted to fulfill will execute and the desired results will occur. Persons skilled in the art of the present invention should appreciate alternate arrangements of the present invention, as the application program may be configured to be a stand-alone program or otherwise integrated within another application program.

The application program is initiated when the user performs various actions at points throughout the website being explored with the web browser. Upon initiation, the application runs and there is an image displayed on the monitor so that the user can capture the data received from the image on their hand-held device. In the preferred embodiment of the present invention, the image will appear in the title bar of the maximized web browser. The image may, however, be located anywhere on the monitor that is visible. For example, the image may appear in the eyes of a pumpkin and people with an appropriate hand-held device could thereby capture the opportunity or benefit on their talking scarecrow doll (hand-held device) that interacts with a ghost story. Furthermore, the image is not limited to a box shape; it may be virtually any shape capable of displaying a large enough image so that users at a specified distance from the monitor can capture data.

The stream of data received by an optical detector of the hand-held device is used to trigger actions on the device or to pass data directly to the device for its use. Data received by the hand-held device can be used in multiple different ways, including those mentioned herein and in Koplal.

In the preferred method of the present invention, the data received by the hand-held device acts as a trigger initiating action on the hand-held device. The device, upon receiving data, looks to see if the data it received matches one of its triggers. For example, if the hand-held device is in the form of a plush mouse, and the mouse receives a trigger that initiates a phrase such as "Hello boys and girls", then upon receipt of the trigger the device will repeat the specified phase. Triggering the device optimizes the amount of data that needs to be passed to the hand-held device.

The present invention therefore describes a mechanism to receive data on a hand-held device from the computer or the Internet without wires. Under the preferred embodiment of the present invention, there is no feedback path from the hand-held device. However, it will be appreciated that the hand-held device may be enhanced with means for feedback by including RF, IR, USB or other means described in Koplar. The hand-held device may collect data and utilize opportunities received from data collection by any of the means described herein or in Koplar.

Under the present invention, a communication path is established to send data streaming from the monitor to the hand-held device. The data is sent by strings of ones and zeros from a varying visual image on the monitor. Ones are detected when the image emanates the frequency, and zeros are detected when the image emanates no frequency. Thus, under the preferred embodiment where the image is shown in the title bar of a web browser, a solid white color in the title bar indicates that no frequency is present and alternating white and black lines indicate that frequency is present. For each instance in time for which the hand-held device is active and its optical detector faces the monitor, if it reads the alternating white and black lines a data bit of one is recorded, and if the lines have not been ready a data bit of zero is recorded. By varying the appearance and frequency of the display of the colors on the screen, data can be transmitted to the hand-held device.

A complexity in transmitting the data to the hand-held device under the present invention is the differing computer, monitor, and video card configurations transmitting the data. Depending upon the configuration, the visual image on the monitor will vary to transmit the proper frequency to the hand-held device. Further, the bit per second transmission rate of the monitor will vary with the refresh rate. The present invention acts independently of the computer configuration as will be described in more detail below.

The monitor typically has a CRT tube which draws a picture across the computer screen and continues down the length of the monitor from top to bottom before beginning with the next reiteration. The monitor emanates an image containing a frequency that the device during each successive refresh (i.e., redrawing) of the screen. During each refresh, an image will display on the specified section of the monitor either indicating that a frequency was present or was not. The hand-held device looks for that specific frequency and records a data bit based on its result. If the frequency displayed by the image is 18 kHz, the hand-held device on each refresh of the

monitor will detect whether an 18 kHz image is present. If the 18 kHz image is present, the data bit present is a one; otherwise, the data bit present is a zero.

Under the present invention, the device receives a binary data stream and one bit per monitor refresh. If the monitor refreshes at 60 Hz, there are 60 bits of data transmitted to the hand-held device in one second. At every monitor refresh, the hand-held device will look to see if the frequency was present or not. If the frequency is present the hand-held device records a data bit of one, and if the frequency is not present the device receives a data bit of zero. The binary data stream provides the data, which can be used as a trigger or stored.

An example of the foregoing is as follows: The application program wants to send a binary code of 1011 to the hand-held device at a frequency of 18 kHz. When the monitor draws one field (i.e., one picture on the screen), it puts the 18kHz image on the screen. The optical detector of the hand-held device reads the monitor, detects the 18 kHz image, and records a data bit of 1. On the next refresh, the application program wants to show a data bit zero and so it erases the image on the screen and puts up a white block (e.g., thereby not containing the 18 kHz image.) When the hand-held device looks again at the monitor, it does not detect the 18 kHz image and therefore records a data bit of 0. The card thus so far has received data bits of 1 and 0. On the next refresh, the monitor displays the 18 kHz image and the hand-held device reads the image and records a data bit of 1. On the final refresh, the monitor leaves the 18 kHz image in place and the hand-held device again reads the image and records another data bit of 1. Thus, the card read the code from the application.

The data signal is preferably sent multiple times to insure that the hand-held was position appropriately and not too much outside interference impeded the transmission. The hand-held device may be set to use each data it receives, or it may compare the results of the stream it received with the previous stream to ensure that the same data is not replicated within the device. An event manager on the hand-held device may make determinations as to what happens when data is received.

As briefly described above, the present invention acts independently of the computer configuration. The application program runs independently by varying the image based on the standard horizontal frequency. The horizontal frequency differs with every monitor setup. The horizontal frequency is determined by 3 factors including the number of pixels on a line, the number of lines in a picture/screen, and the vertical refresh rate. Therefore, video cards

configured of differing resolutions will have different horizontal frequencies. The differing horizontal frequencies impact the frequency at which the image on the monitor is displayed, and therefore the horizontal frequency is taken into account by the application program when displaying the image.

For example, if a computer video card is configured to run a monitor in 800 x 600 running at 60 Hz and the desired image frequency is 18 kHz, the image will have one line set to white, the second is black, the third line white, and fourth line black, and so on. The result of that is an image frequency of 18 kHz. If the video card was configured to 1024 x 768, the first 1¼ lines white need to be white, the next 1¼ lines black and so on to get the 18 kHz frequency.

The application program makes the adjustment based on the horizontal frequency. Operating systems such as Windows make the number of pixels per line and the number of lines per screen available. A statistical testing program measures the vertical refresh rate by recording the time it takes for screen drawing to occur. The application program then stores the configuration in the windows registry. The registry is data stamped so that on a daily basis the application will re-run this configuration program. It will be appreciated in the art that then statistical data could however be stored in alternate locations, and that other variations of time stamp checking could occur.

The hand-held device may be any of the configurations suggested in Koplar or herein, including smart cards, cell phones, PDAs, toys, and plush animals. The only limiting factor of what type of hand-held device 12 that may be used with the present invention is the device must 12 have optical detector 30 or other means of reading the image from display device 10, and the technology within device 12 to interpret the data received as with the present invention. It should be understood in the art that the technology for processing the data as described below could be implemented in hardware, software, or a combination of hardware and software.

The optical detector of the hand-held device acquires the light from the direction of the computer monitor and filters out the non-usable frequencies. The hand-held device first processes the received data to determine what image was present. The band pass filter eliminates leftover signal noise and leaves any present image frequency. Thus, the signal leaving the band is either something or nothing. The rectifier takes the absolute value of the signal and adds it to the integrator. The integrator accumulates each portion of the image signal received in each refresh to determine if the signal received was an image or noise. If there is sufficient signal to conclude

that a signal was present, the micro controller reports a value of one; otherwise, a value of zero is reported.

The hand-held device determines how frequently it must sample the monitor. The signal after its original filtration also proceeds to an envelope detector, which attempts to match the signal received to various monitor refresh rates. The matching results are passed to the vertical sync reconstruction to determine which of the standard refresh rates the monitor is using. The application program thus transmits sufficient information along with the data to the hand-held device so that the device can determine the horizontal frequency of the computer monitor and determine how many times per second it must look for an image and record data bits.

Referring to block diagram **FIG. 18**, it may be observed that light is first acquired **200**, then processed through a high pass filter **210** and low pass filter **220** to detect the auxiliary data as described above. A first portion of the signal is then processed by envelope detector **230** and vertical sync reconstruction **240** to determine the configuration of the monitor, the results of which are passed to the microcontroller **280**. A second portion of the signal travels through the VEIL frequency bandpass filter **250**, signal rectifier **260**, and integrator **270** pursuant to the repeated requests of microcontroller **280**. Microcontroller **280**, upon receiving data upon each segment request, provides system output **290**.

In view of the foregoing description of the present invention and practical embodiments it will be seen that the several objects of the invention are achieved and other advantages are attained. The embodiments and examples were chosen and described in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated.

As various modifications could be made in the constructions and methods herein described and illustrated without departing from the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative rather than limiting.

The breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with claims of the application and their equivalents.

The present system and hand-held devices useful in the system may be for these purposes distributed by various business entities, which may include not only the sponsor of a program, event, or other sponsored transmission, but may also include various businesses, services and organizations having commercial relationships with the sponsor. Viewer's use of the new devices of the invention accordingly provide commercially advantageous results relating to television advertising, promotions and other sponsored transmissions, wherein new system and devices and their use is effective to:

- Attract viewer attention to advertising, promotions and other sponsored transmissions
- Effectively increase awareness and retention of message and product
- Induce viewers to respond and take action after viewing to sponsored transmissions
- Differentiate a sponsor's product or service from those of competitors.
- Stimulate viewers to desire to watch advertising, promotions and transmissions.
- Provide a novel, cost-effective, brand efficient, and enjoyable medium for enhancing advertising, promotions and other transmissions
- Cause advertising, promotions and transmissions to take on special event significance
- Build customer traffic in places of business or points of sale associated with sponsors of advertising, promotions and other transmissions
- Increase consumer loyalty to sponsors of advertising, promotions and transmissions
- Increase viewer involvement in sponsored advertising, promotions and transmissions
- Cause viewer retention of sponsor identity and advertising or promotional content
- Enhance sales volume resulting from the sponsorship of advertising, promotions and transmissions
- Provide lasting value to sponsored advertising, promotions and transmissions
- Provide enhanced viewer/spectator involvement in sporting and racing events
- Afford viewers of television programming an opportunity to interact meaningfully with programming content and with advertising, promotions and transmissions.
- Enhance viewer good-will relative to advertising, promotions and events.
- Cause development of still other opportunities for interactive use of the devices.

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